CLAIMS

WHAT IS CLAIMED IS:

1. A method for manufacturing an optical article comprising the steps of:

a) providing a substrate tube;

b) forming one or more cladding layers inside the substrate tube, the one or more cladding layers including an innermost cladding layer;

c) forming a concentric fluorine reservoir adjacent to the innermost cladding layer; and

d) forming a core adjacent to the fluorine reservoir and concentric with the one or more outer cladding layers;

e) wherein the fluorine concentration in the fluorine reservoir is higher than the fluorine concentration in either the core or the innermost cladding layer.

2. The method of claim 1, wherein the fluorine concentration in the fluorine reservoir is at least 30% higher than the fluorine concentration in either the core or the innermost cladding layer.

3. The method of claim 1, wherein the fluorine concentration in the fluorine reservoir is at least 50% higher than the fluorine concentration in either the core or the innermost cladding layer.

4. The method of claim 1 wherein the fluorine concentration in the fluorine reservoir is at least 100% higher than the fluorine concentration in either the core or the innermost cladding layer.

5. The method of claim 1, wherein the steps of forming include the step of applying one or more of the following methods MCVD, sol-gel doping, coating, PCVD

6. The method of claim 1, further comprising the step of placing a diffusion barrier layer in the cladding layer.

7. The method of claim 1, further comprising the step of placing a diffusion barrier layer in the core.

8. The method of claim 1, wherein the fluorine concentration in the fluorine reservoir is between 0.7 and 4.0 mol%.

9. The method of claim 1, wherein the core comprises silica and an active rare earth dopant.

10. The method of claim 1, wherein the core comprises a halide-doped silicate glass that comprises approximately the following in cation-plus-halide mole percent85-99 mol% SiO_2, 0.25-5 mol% Al_2O_3, 0.05-1.5 mol% La_2O_3, 0.0005-0.75 mol% Er_2O_3, 0.5-6 mol% F, 0-1 mol% Cl.

11. The method of claim 1, wherein the core comprises a halide-doped silicate glass that comprises approximately the following in cation-plus-halide mole percent. 93-98 mol% SiO_2,1.5-3.5 mol% Al_2O_3, 0.25-1.0 mol% La_2O_3, 0.0005-0.075 mol% Er_2O_3, 0.5-2 mol% F, 0-0.5 mol% Cl.

12. The method of claim 1, the core further comprising fluorine.

13. The method of claim 1, wherein the fluorine reservoir further comprises silica and phosphorus oxide.

14. The method of claim 13, wherein the reservoir comprises phosphorus oxide and fluorine in approximately equal concentrations.

15. The method of claim 13, wherein the reservoir comprises a greater percentage of fluorine than phosphorus oxide.

16. The method of claim 1, wherein the reservoir comprises about 95.7-99.7 mol% silica, about 0.3-4 mol% fluorine and about 0-0.4 mol% phosphorus oxide.

17. The method of claim 1, wherein the innermost cladding comprises silica, fluorine and phosphorus oxide, wherein the cladding comprises at least 95 mol% silica.

18. The method of claim 1, wherein the innermost cladding comprises silica, fluorine and phosphorus oxide, wherein the innermost cladding has a refractive index matched to the refractive index of the silica substrate tube.

19. The method of claim 1, wherein the innermost cladding comprises silica, fluorine and phosphorus oxide, wherein the outermost cladding has a refractive index matched to the refractive index of the silica substrate tube, and the innermost cladding has a lower refractive index than either the outermost cladding or the silica substrate tube.

20. The method of claim 1, wherein the innermost cladding comprises silica, fluorine and phosphorus oxide, wherein the mol % of fluorine and phosphorus oxide present is approximately 0.8 and 0.7 mol% respectively.

21. The method of claim 1, wherein the innermost cladding has a refractive index that is less than that of the substrate tube, wherein the innermost cladding comprises approximately 0.3 mol% of phosphorus oxide and at least 2.0 mol % of fluorine.

22. An optical fiber manufactured in accordance with the method of claim 1.

23. An optical preform manufactured in accordance with the method of claim 1.

24. An optical fiber manufactured from the optical preform of claim 22.

25. A method for manufacturing an optical fiber comprising the steps of:

a) providing a substrate tube;

b) forming one or more outer cladding layers;

c) forming a reservoir including fluorine, the reservoir being concentric with the one or more outer cladding layers and adjacent to the innermost cladding layer;

d) forming a core adjacent to the reservoir and concentric with the one or more outer cladding layers;

e) wherein the fluorine concentration in the reservoir is higher than the fluorine concentration in either the core or the innermost cladding; and

f) diffusing at least a portion of the fluorine in the reservoir to form a fluorine concentration zone.

26. The method of claim 24, wherein the step of diffusing the fluorine comprises achieving a desired fluorine concentration profile by heating the reservoir.

27. The method of claim 25, wherein the step of heating comprises applying heat to the substrate tube and collapsing the tube into a preform.

28. The method of claim 26, further comprising the step of heat treating the substrate tube to diffuse the fluorine before the step of collapsing the tube.

29. The method of claim 24, further comprising the step of collapsing the substrate tube into a preform and drawing an optical fiber from the preform, wherein the step of diffusing comprises drawing the fiber.

30. The method of claim 25 wherein additional heat treatments are performed to the preform to enhance fluorine diffusion

31. The method of claim 25 wherein additional heat treatments are performed to the fiber to enhance fluorine diffusion

32. The method of claim 24, further comprising the step of forming a diffusion barrier layer between the cladding and the fluorine reservoir.

33. An optical fiber manufactured in accordance with the method of claim 24.

34. An optical preform manufactured in accordance with the method of claim 24.

35. A method for manufacturing an optical article comprising the steps of:

a) forming a core;

b) forming a fluorine reservoir concentric adjacent to the core;

c) forming one or more cladding layers, the one or more cladding layers including an innermost cladding layer and concentric to the core;

d) wherein the fluorine concentration in the fluorine reservoir is higher than the fluorine concentration in either the core or the innermost cladding layer.